

Hagit Borer

Wherefore roots?

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1 Introduction

At the very core of the ‘root’ discussion there lies the assumption that the proper characterization of syntactic terminals is crucial to our understanding of syntactic structure. It is important to highlight this fact precisely because it is not shared by all syntactic models. Construction Grammar, for instance, would seriously question the degree to which syntactic terminals, of any sort, determine or even shed any light on the properties of syntactic structures. Less radically, Ramchand’s (2008) First Phase Syntax seriously questions the need for ‘substantive’ terminals of any sort, restricting itself to functional sequences, with ‘substantive’ items corresponding not to a terminal, but rather to a span (in the sense of Svenonius, 2013), i.e. a phonological realization of constructions, and not of terminals.

In turn, and insofar as it is assumed, rather widely, that terminals *do* inform our understanding of syntactic structure, the question is, of course, what terminals, what properties they have, and how they contribute to our understanding of syntactic composition.

Beginning with Chomsky (1965), standard models within Generative Grammar have assumed an increasing role for substantive terminals in determining grammatical structure. For the past two decades, however, an increasing number of scholars have come to question the central role which such substantive items play in the construction of syntactic structures. Within the family of approaches that has emerged as a result, a central role is played not by a ‘word’ or a ‘lexeme’ in the traditional sense, but rather, by a ‘root’. Within all of these approaches, there is a general understanding that roots are at the very least devoid of syntactic category as well as of any discernible morpho-phonological complexity. Beyond that, however, what ‘roots’ are, exactly, is by no means agreed upon, and as a consequence, there is little agreement on how, exactly, they interact with the syntax or, indeed, whether they are altogether necessary.

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Harley (henceforth H) does not actually address, directly, the question of whether roots are altogether necessary syntactic constituents. The necessity for such terminals in her system does emerge, however, from the discussion. Roots, for H, have neither phonological properties nor any Content outside of syntactic context.¹ It therefore follows that the syntactic need for them cannot be guided by these factors. However, roots are argued to take complements, and, as a correlate, to project. For H, then, roots are necessary because they determine the properties of ‘first merge’ through selection. As this claim is at the core of what roots are (as opposed to what they are not), the arguments for root complement selection deserve a closer look.

2 Complement selection by roots?

The claim that roots take complements was first advanced in Marantz (1997), modeled largely after the treatment of category neutral items in Chomsky (1970). Subsequent work within root-based approaches, however, has moved away from that claim, to argue, rather, that all event arguments are licensed through functional structure (see Borer, 1999, 2003, 2005, Alexiadou 2001; Mateu, 2002, Acedo-Mattelan and Mateu, to appear, Marantz 2013, Alexiadou and Lohndal, this issue). H does not engage directly with those arguments, but rather, provides three arguments for the existence of the constituent \sqrt{P} , consisting of the head root and its selected complement. We address the first two arguments in this section. Section 3 focuses on the third argument, from Hiaki, in conjunction with the claim, central to H’s notion of roots, that roots allow suppletion – i.e. contextually triggered radical stem alternations.

2.1 *do-so* and *one* substitution

As is well known, both *do-so* substitution and *one* substitution may not target an isolated head in the presence of a complement (unlike, e.g. Gapping). As such, they provide, at least *prima facie*, evidence for the existence of a privileged unit consisting of [head+complement]. Matters are, however, not so simple, precisely because *do-so* and *one* are not restricted to substituting the domain of head-complement, but rather may include adjuncts as well. Harley’s argument for

¹ Content, here and throughout, in reference to encyclopedic meaning, and as such at least potentially distinct from whatever facets of interpretation may emerge from formal semantics, either through the formal properties of functors (e.g. quantifiers, determiners etc.) or through syntactic configurations (e.g. scope).

complements for roots is thus based on attempting to define the proper domain for the application of *do-so* and *one* substitution, with the conclusion that per force, to be compatible with Bare Phrase Structure, it must be the case that there exists a domain that includes the root and its complement. The argument, as it stands (and as Harley acknowledges in fn. 22), is rather theory internal, and the very same results, equally compatible with BPS, can be obtained, e.g. from the schematic structure in (1) (among many other options), if we assume that the domain of substitution is defined by F2, otherwise licensing the equivalent of an internal argument, and that adjuncts are adjoined to F2:

- (1) [_{F3} external argument [_{F2} adjunct [_{F2} [~~root~~] [_{F1} ‘internal’ argument [root]]]]]

As it turns out, however, the proposal is not only inconclusive, it also runs into direct empirical problems because *one* and *do so* substitution clearly operate at levels in which root-related complements are not available. Thus derived verbs and nominals derived from them exhibit exactly the same substitution patterns:

- (2) a. my kid verbalized an adjective in the morning and yours did so (*a noun) in the afternoon
 b. two surprising verbalizations of an adjective by a 3-yr old child and one trivial one (*of a noun) by an adult

The derived items *verbalize/verbalization* are fully compositional, thereby excluding the possibility that we are dealing here with a reanalyzed root. Clearly, in the context provided, *verbal* means, directly, ‘have verb-like properties’, and *verbalize* means, ‘cause x to have verb-like properties’. *Verbalization*, finally, means ‘the act of causing x to have verb-like properties’. One could even propose some formal mechanism by which the putative (external) argument of *verbal*, an adjective, comes to be interpreted as the internal argument of *verbalize*, and a mechanism allowing all this information to be inherited by the derived nominal *verbalization*. None of these, however, could possibly be stated on the level of the root. If we assume the root of *verbaliz/ation* to be $\sqrt{_{986}}$ with the spellout /verb/ and with the Content VERB, which appears straightforward enough, we are dealing here with a structure at least as complex as (3):

- (3) [_n [_v [_a (arg) [$\sqrt{_{986}}$] α_{al}] v_{ize}] n_{ation}]

It is clear that there could simply be no constituent here that contains [$\sqrt{_{986}}$ – complement]. As a result, there may be argument from *one* and *do-so* substitution for a constituent containing a head of some sort and a ‘complement’, but there is simply no argument here for the specific constituent [root-complement].

We note, finally, that *one* substitution may apply in cases where the claim that the root actually *selects* a complement appear, at the very least, counter-intuitive:

- (4) two new CDs of arias by Harteros/from Germany and one used one (*of Lieder) by Kaufmann/from the US

To accommodate *one* substitution in (4), we would have to assume that the root to be eventually spelled out as CD (say $\sqrt{_{201}}$) is specified to take a complement, presumably optionally. Alternatively, we could say that $\sqrt{_{201}}$ merges optionally with a complement, and is matched with Content in that context that is compatible with that complement. But under that execution, roots no longer have syntactic properties, beyond the trivial statement that they can merge with a constituent, and that if they do, such a constituent would be their ‘complement’.

2.2 Complements and phrasal idioms

It is well established, at least since Marantz (1984), that phrasal idioms which contain arguments favor S[VO] configurations, and [SV]O idioms are rare, if at all attested. There is little to tell us, however, that the relevant domain is specifically that of [root+complement]. To wit, if, as Harley herself contends, the Content domain of idioms is delimited by VoiceP, that, in and of itself, derives these results, rather stripping us of an argument for a \sqrt{P} containing the root and its argument.

As in the case of *do-so* and *one*, the prediction here is that derived verbs would not give rise to phrasal idioms. English, as it turns out, is not necessarily the best language in which to test that prediction, as most derived verbs in English are Latinate, and Latinate vocabulary, in English, doesn’t easily enter phrasal idioms. When we turn to Hebrew, we find that derived verbs quite readily enter idiomatic expressions, as the following small selection shows:

- (5) a. hoci diba/hoci ’et dibat-o raza
 made.exit libel/made.exit OM libel-his badly OM = object marker
 ‘libeled X/bad mouthed X’
 b. hilbin pney X (b-a.rabim)
 whitened face X (in-the-multitude)
 ‘shamed X’ (lit: whitened X’s face (in public))
 c. hexzir zatar le-yošn-a
 returned.trans crown to-oldness-her
 ‘restored old glory’

For each of the verbs in (5), there exist a source verb/adjective, or possibly root, from which it is clearly derived, and where the Content relatedness is transparent. In all these cases, the ‘source’ form does not allow the relevant idiomatic reading:

- (6) a. *ha.diba yac’a ((le-) raʔa)
 the.libel exited ((to) badly)
 ‘the libel exited’ (incoherent)
- b. pana-v hilbinu (b-a.rabim) /pana.v (hayu) lebanot
 face-his whitened (in the multitude)/face-his (were) white
 (ba-rabim)
 (in the multitude)
 ‘his face became white/his face was white (in public) → no *shame*
 implication
- c. ha.ʔatara xazra le-yošn-a
 the-crown returned.intrans to-oldness-her
 ‘the crown returned to its oldness’ (incoherent)

The idioms in (5) benefit from a comparison with cases in which the idiomatic Content is derived. Consider, for instance, the following expressions, both involving the derived verb *hoci* ‘make-exit’ as in (5a):

- (7) a. hoci X mi-daʔat-o
 made.exit X from-mind-his
 ‘drive X mad’
- b. hoci X min ha-klelim
 made.exit X from the vessels
 ‘anger X’

As it turns out, in these cases the source verb, *yaca*, ‘exit’, does occur with the same complements, and with the identical idiomatic Content:

- (8) a. hu yaca mi-dazato
 he exited from-mind-his
 ‘he has gone mad’
- b. yacati min ha-kelim
 exited.I from the vessels
 ‘I became angry’

One could advance the view that in (8a–b), the idiomatic meaning is based on the unit [root-complement], and that the cases in (7) are derived from the embedding of such [root-complement] units under CAUSE (or equivalent).² However, if that is the analysis advanced for (8a–b), it clearly must be the case that the idiomatic Content of (5a), with the identical derived verb, is possible although it cannot involve an argument of the root. It thus emerges, ipso facto, that to the extent that the pairs in (7)–(8) appear to provide potential evidence for the privileged idiomatic status of [root-complement], that very same evidence forces us to assume that such idiomatic combinations are perfectly licit with non-root, derived verbs, as in (5).

3 Hiaki root selection and suppletion

The final argument H provides for the privileged relationship between a root and its complement is based on suppletion in Hiaki. Hiaki suppletion, elsewhere in H's article, is at the core of the claim that roots do not have independent phonological properties, and as a result, this particular argument merits closer attention.

It is worthwhile noting that the number of cases we are dealing with here is very small. Hiaki is reported to have 12–14 cases of agreement-based verbal suppletion (possibly as many as 16 are reported in Hopi). However, the vast majority of them are intransitive. While these may be, as H argues, unaccusative, it cannot be excluded that suppletion for intransitives, assuming it to be truly present, involves the realization of the root in the context of subject agreement. For H syntactic case, then, the crucial cases are the transitive ones. As the language does not have object agreement, the only plausible trigger for such suppletion, H reasons, is the head-complement relations. As suppletion is by assumption local and root-based, it follows that the complement must merge with the root in order to provide the appropriate environment for the suppletive realization to be selected.

We note before proceeding that Hiaki (and Uro-Aztec in general) does not have synthetic derived verbs, and that distinguishing, for the purpose of spellout, between the local environment of an underived verb and the local environment of

² We note as an aside that there is an argument here for syntactic word formation, quite regardless of whether the original idiomatic Content is associated with the root or with some other constituent.

a root is a tricky matter.^{3,4} The account proposed by Harley, however, faces a much more serious problem which once articulated turns out to deeply undermine the claim that the relevant Hiaki cases involve alternative realizations of the same root. To see that this is the case it is worthwhile digressing briefly to pursue the logic of the argument for suppletion – any argument for suppletion.

At the core of our linguistic description, there lie correlations between pairs with systematic contrastive properties. To wit, the reason we hypothesize that Natural Language represents tense is that at least in some languages, there exist pairs such as *jump-jumped*, *realize-realized* with predictable meaning correspondence. The primary reason we do not, for example, hypothesize that NL in general or English in particular represents, structurally, color terms is because we have little evidence for any contrastive pairs within that domain. Morphophonological realization of such contrasts is neither necessary nor sufficient to establish their existence. However, it remain at the core of our data gathering method, quite simply because absent phonological contrasts, our present tools of observations frequently fall short of diagnosing relatedness. Insofar as any theory is an attempt to model its primary data, linguistic theories have been, and remain, first and foremost, theories constructed to account for phonological relatedness.

By extension, linguistic modeling has benefitted greatly from contrastive pairs based precisely on the presence vs. absence of phonological properties. To wit, we take it to be significant that the understood object of e.g. *kick* is normally pronounced adjacent to the verb, but sentence initially in questions. We take it to be significant that PRO, with properties modeled after those of overt pronouns, nonetheless exhibits restricted distribution, correlating with the absence of phonological realization. Properties of abstract operators are modeled after those of overt ones, with the assumption that the absence of phonological realization in such cases may be indicative of some important properties. Other examples abound.

Consider, from this perspective, triplets such as English *sing-sang-sung* or *buy-bought-bought*. They differ, in terms of their realization, from *walk-walked-walked*, to be sure, but they do fulfil the same function, and their interpretation can be described along the structural lines developed to account for the more predictable phonological realizations associated with *walk-walked-walked*. Hence emerges the notion that *sing-sang-sung* are (contextual) allomorphs, which is to

³ See Embick (2010) as well as Borer (2013a) for lengthy discussions of this matter.

⁴ At least in Hopi, the relevant verbs can be embedded under a Causative affix. This affixation, however, is almost certainly analytic in nature, and has no impact on the argument configuration of the domain embedded under it.

say alternative realizations for the root/verb in the syntactic context which would otherwise guide the emergence of triplets such as *walk-walked-walked*. The claim that suppletion, i.e. radical phonological variance in root realization, is at play for the *go-went-gone* triplet in English follows the same rationale – because verbs typically come, in English, in up to three realizations, and because these realizations correspond, predictably, to tense/aspect distinctions, and because *went* clearly is what we would use to express the past tense of what, in present, would be *go*, it is *prima facie* attractive to assume that the relationship between *go-went* is the very same as that which holds between *walk* and *walked* or *sing* and *sang*. But if so, then we must allow radically distinct phonological realizations for the same root or verb, as H advocates.

Indeed, once this logic is laid out in detail, the only surprising fact is that allomorphy is so common, typologically, while suppletion (for non-functional items) is so rare. Veselinova (2006), in a definitive study of verb suppletion, shows that while suppletion for *go/come* is attested in 25% of languages surveyed (237), second highest, for *talk/say*, comes at 19%. Below that, *take, give, do* and *see* occur at 10% of languages, and below *that* numbers dwindle to statistical insignificance, in most cases an isolated instance in some language. The picture that emerges from Bobaljik's (2012) typological study of suppletion within the domain of comparative adjectives is even sharper. Of the 157 languages surveyed, 24 exhibited some form of suppletion for the adjective *good* and 18 for *bad* (some with multiple variants). Adjectives such as *big/great* and *small* are attested, with suppletive patterns, in 7–8 languages (5%). Other instances of adjective suppletion are virtually non-existent. H suggests that the culprit here is the heuristics of acquisition, rather than properties of NL as such, citing the well-known claim that allomorphy and idiosyncrasy in general is allowed to persist only in what is frequent, with frequency reinforcing the pattern. While that may be correct, it remains the fact that of the 300 most common English verbs, upward of 150 exhibit tense-related contextual allomorphy, all, by assumption, cases which require high frequency to be maintained, but there is only one single case of suppletion.

Suppose, however, we go beyond the typological rarity to investigate, rather, the actual case under consideration, i.e. the claim that in Uro-Aztecan in general, and in Hiaki in particular, suppletion can be conditioned by the number specification of the object. Suppose further we apply to such cases the rationale which would lead one to speculate that *went* is a suppletive form of the root otherwise typically realized as *go*.

Once that rationale is pursued, cases of 'object-based' suppletion in Hiaki emerge as extremely exotic. Whatever the merits of the claim that *go-went* are alternative phonological realizations of the same root, we note that it rises and

falls on two facts: tense distinctions are typically realized in English, and there is, otherwise, no phonologically-related past tense form for *go* or a present tense form for *went* in present day English. To argue the case for suppletion in Hiaki, by analogy, what would be required is independent evidence that roots/verbs in Hiaki typically mark the number properties of their complements, and that in a sufficient number of cases, such marking is regular or possibly gives rise to contextual allomorphs. Against that background, the emergence of a handful of forms with a stem change would indeed appear to gain credence as a case of suppletion. However, no such evidence is available. What we are asked to subscribe to, then, is the claim that suppletion must exist in Hiaki and in Natural Language, in general, because of a putative grammatical distinction which is *only* realized through suppletion, but exhibits neither regular correlates, nor allomorphic ones.

For Corbett (2000), this profile adds up to the claim that such cases do not involve contextual realization, or ‘suppletion’ but rather, what is involved is verbal number marking which is not sensitive to context. Absent sensitivity to context, verbal number is typically taken to involve a change in the inherent meaning of the verb, or in traditional terminology, a lexical property (see Durie 1986; Mithun 1988; Corbett 2000; Bliss, 2004), and indeed, the vast majority of scholars who have considered the paradigm take it to involve two distinct verbs, and Veselinova herself remains rather skeptical that these are true cases of suppletion, by her criteria. Mithun (1988) discussing the very same phenomena in Hopi, argues that the stem change, rather than marking sensitivity to the properties of the complement, in actuality denotes “effect of actions, states, or events” which may (or may not) create expectations relative to the number of participants. By analogy, one need only consider the English verbs *murder* and *massacre* side by side to see how extremely similar Content can give rise to distinct expectations concerning the number of object participants. But would we be justified in assuming that *murder* and *massacre* constitute alternative realizations of the same root, conditioned *grammatically* by the concrete or metaphorical number properties of the object? And if we do, would we be able to retain, coherently, any falsifiable generalizations concerning linguistic relatedness?

4 A brief note on faithfulness

As it turns out, and beyond the non-falsifiable nature of most claims about suppletive correlations, there are actually negative syntactic consequences to the claim that the phonological realization of roots may involve radical stem alternation, some which are discussed in some detail in Borer (2003, 2013a).

An illustration might be useful. Taking as our starting point Grimshaw's (1990) typology of derived nominals, we note that AS-nominals – Grimshaw's Complex Event Nominals (in English, Romance, Slavic, Greek, Semitic) must have a discernible, phonologically related verbal source.⁵ Specifically, and considering the contrast in (9–10), we note that Simple Event Nominals (in the sense of Grimshaw, 1990, cf. (9)), may denote an event, but do not license aspectual modifiers or implicit argument control internal to the nominal:

- (9) a. the {*class/seminar/concert/activity*} took place at sunset and lasted 90 minutes
 b. the {*class/seminar/concert/activity*} (?of physics/arias) (*by the instructor) (*to explain the exam) (*for 90 minutes)
- (10) a. the {*teaching/examination*} took place at sunset and lasted 90 minutes
 b. the {*teaching/examination*} of physics (by the instructor) (to improve the students' performance) (for 90 minutes)

A particularly striking illustration comes from Modern Hebrew. MH allows, extremely productively, the borrowing of *-ation* nominals:

- (11) *transformacya konstrukcyja derivacyja administracyja*
 transformation construction derivation administration
glorifikacya . . . [M. Hebrew]
 glorification . . .

At least at times, the borrowed form co-exists with a native derived nominal with an identical Content. The following cases illustrate the occurrence of both forms side by side, with the borrowed form used to facilitate the comprehension of the domain-specific use of the native form:

⁵ The generalization has come under attack in Newmeyer (2009). However, the putative counterexamples cited by Newmeyer involve an across-the-board misapplication of the original diagnostics suggested by Grimshaw (1990), and upon closer scrutiny turn out not be AS-nominals altogether.

The generalization under consideration here is distinct from that put forth in Grimshaw (1990) (and endorsed in Borer, 2003, 2013a), according to which zero-marked deverbal nominals cannot be AS-nominals. Regardless of the veracity of the latter generalization, it directly involves cases in which the noun and the verb are phonologically identical, making the issue of phonological faithfulness moot.

- (12) gam zavodot ha.bayit hen *produkcyā*, gam hen
 also works the.house are production also they
 [borrowed]
yiccur [Hebrew Wikipedia]
 production
 [native]
 ‘domestic labor as well is production (borrowed), it is also production (native)’
- (13) *histagglut* evolucyonit o *adaptacyā* hi ha.derek še-b.a
 adaptation evolutionary or adaptation she the.way that-in-her
 [native] [borrowed]
organizim mitmodedim zim qšayim be-sibat
 organisms cope with difficulties in-environment
ha.mixya [Hebrew Wikipedia]
 the.living
 ‘Evolutionary adaptation (native) or adaptation (borrowed) is the way in
 which organisms cope with difficulties in their living environment’

These very same vocabulary items, established by the contexts in (12)–(13) to be directly synonymous, nonetheless behave very differently when embedded within AS-nominals, with the native form licit, and the borrowed one directly excluded:

- (14) a. *ha.yiccur* šel ha.mexoniot be-ʔesrim šaʔot kedey
 the.production of the.cars in-20 hours in-order
 le.qadem et ha.kalkala
 to advance OM the.economy
 b. **ha.produkcyā* šel ha.mexoniyot (be-ʔesrim šaʔot) kedey
 the.production of the.cars in 20 hours in-order
 le.kqadem et ha.kalkala
 to advance OM the.economy
 ‘the production of the cars in 20 hours in order to advance the economy’
- (15) a. *ha.histagglut* šel ha.neandertalim le-ʔaqlim eropa tok
 the.adaptation of the.Neanderthals to-climate Europe in
 20,000 šanim
 20,000 years
 b. **ha.ʔadaptacyā* šel ha.neandertalim le-ʔaqlim eropa tok
 the.adaptation of the.Neanderthals to-climate Europe in
 20,000 šanim
 20,000 year

‘the adaptation of the Neanderthals to the climate in Europe in 20,000 years’

We note now that in a system that allows suppletion, all these results become coincidental. Specifically, there is nothing to bar the derivations in (16) for Hebrew, or those in (17) for English:⁶

- (16) a. $\sqrt{_{358}} \rightarrow \text{šinna}$ / $[\text{v} \text{ } ____]$
 b. $\sqrt{_{358}} \rightarrow \text{šinnui}$ / $[\text{N} \text{ } ____]$ (or $[\text{N} [\text{v} \text{ } ____]]$)
 c. $\sqrt{_{358}} \rightarrow \text{transformacia}$ / $[\text{N} \text{ } ____]$ (or $[\text{N} [\text{v} \text{ } ____]]$)
- (17) a. $\sqrt{_{912}} \rightarrow \text{teach}$ / $[\text{v} \text{ } ____]$
 b. $\sqrt{_{912}} \rightarrow \text{class}$ / $[\text{N} \text{ } ____]$

It thus emerges that whether or not derivations are phonologically faithful actually has direct syntactic consequences – if one gives up on maintaining such phonological faithfulness, the systematic *syntactic* restrictions on the distribution of AS-nominals cannot be captured. Needless to say, the derivations in (16)–(17) are directly excluded if we take the phonological information associated with roots to be sufficiently independently specified to exclude radical stem alternations.

5 Roots, Complements, Content

I fully concur with the conclusion, put forth in H, that roots have no Content in isolation (see Borer 2009, 2013a,b for rather extensive discussion). H’s roots do, however, have Content, albeit in context, a claim which I believe is rather problematic. Pivotal to the ensuing discussion is the following representation (H’s 17):

- (18) Interface instructions for the root node for *-ceive*:

LF instructions (List 3)

$\sqrt{683} \Leftrightarrow \text{“think”} / [\text{v} [[\text{con-}]_{\text{p}} [\text{ } ____] \sqrt{\text{ }}]]_{\text{vp}}$
 $\Leftrightarrow \text{“fake”} / [\text{v} [[\text{de-}]_{\text{p}} [\text{ } ____] \sqrt{\text{ }}]]_{\text{vp}}$

...

Note, specifically, that what receives Content, encyclopedic meaning, in this case is not the whole formation *conceive* or *receive*, but rather *ceive*. By exten-

⁶ The objection, we note, applies not only to the suppletion-based system put forth in H, but also to spanning-type executions, as in the Ramchand (2008)/Svenonius (2013) approach.

sion, consider the cases in (19) all with a root realized (across the board) as *nat* ($=\sqrt[104]{}$)

(19) *nation; nature; naturalize*

Following the logic outlined in (18), we now must assume that in each of these cases $\sqrt[104]{}$ is assigned some Content in a context, which in turn underlies whatever (compositional) Content now emerges from its combination with *-tion* and *-ure* respectively, as well as with *-ure-al-ize*, for *naturalize*.

A number of difficulties emerge immediately. Note, first, that arguably both *-tion* and *-ure* are realizations of $\mathbf{n}_{\text{event}}$. The emerging Content, however, is quite distinct. To capture the difference, one would have to introduce not only syntactic context, but also facets of spellout as conditioning the choice of Content for root $\sqrt[104]{}$. Another obvious conceptual difficulty involves the fact that what $\sqrt[104]{}$ actually means in the context of *nation*, *nature* and *naturalize* is less than obvious. We certainly do know the meaning of the whole, but an attempt to match Content with the segment *nat* appears rather hopeless, or worse, circular. No less troubling is the inevitable conclusion that the entry for $\sqrt[104]{}$ would have to include an exhaustive list of all the derived forms that it may enter, together with what *nat* would mean in each case.

A formal problem emerges as well when we consider the putative Content of $\sqrt[104]{}$ in the context of *naturalize*, under the plausible bracketing in (20):

(20) $\sqrt[104]{} \Leftrightarrow \text{"????"} \quad / \quad [[[\dots [\text{ }] \mathbf{n}_{\text{ure}}] \mathbf{a}_{\text{al}}] \mathbf{v}_{\text{ize}}]$

Matching any Content with $\sqrt[104]{}$ in this context appears rather senseless. However, quite apart from that, if H is correct in allowing non-compositional Content for such complex structures, and I believe she is, then whatever Content would be assigned to $\sqrt[104]{}$ would be in a non-local context. That properties of roots are realized locally is not only well-established within the phonological domain, it is a claim which H endorses, directly and indirectly, throughout her article. As matters stand, however, that conclusion is incompatible with the claim that roots acquire Content in context.

Matters become even worse when we consider phrasal idioms.⁷ Consider specifically, a phrasal idioms such as *kick the bucket*. Following the logic outlined in H, we would need to claim that the root $\sqrt[98]{}$, ‘elsewhere’ realized as *kick* and

⁷ Whether phrasal idioms and complex words are similarly assigned Content is a matter I set aside here, but see Borer (2013a) for extensive argumentation that quite independently of the Content of roots, the mechanisms must be kept separate.

‘elsewhere’ assigned the Content *KICK* is actually matched with some other Content, say *DIE* (?) in the context of root $\sqrt{_{290}}$, itself elsewhere associated with the Content *BUCKET*. In turn, root $\sqrt{_{290}}$, elsewhere with the Content *BUCKET* would be assigned some other Content (???) in the context of root $\sqrt{_{98}}$, but only when the latter is actually assigned the Content *DIE*. Among other consequences, the idiom *kick the bucket* would now need to be listed, separately, as part of the information associated with both (roots) *kick* and *bucket*.

The non-circular alternative is self-evident. Clearly, neither *kick* nor *bucket* are assigned Content in the context of the idiom *kick the bucket*. Rather, what is assigned Content is the constituent as a whole. By a similar rationale, neither *nat* nor *ceive* are assigned Content, nor, for that matter, are *nature* and *natural* within *naturalize* when the relevant Content is *NATURALIZE – become citizen*. Rather, Content is assigned to *receive* or to *naturalize* as a whole. But if that is the case, then there is little reason to assume that roots are ever assigned Content, with or without context. Content, rather, is always associated with (labeled) syntactic constituents, at times with considerable internal complexity. To the extent that we perceive the ‘root’ realized as *dog* to have Content, then, this is not because the root itself has Content but rather, [_N $\sqrt{\text{DOG}}$] has Content, distinct, we note, from that associated with [_V $\sqrt{\text{DOG}}$]. It is precisely in this sense that we could view *cat* as a phrasal idiom, following very much on the intuition first articulated in Marantz (1996).⁸

6 So why roots?

Roots, we concluded, have no syntactic properties – they have no category, they do not take complements, and there is no evidence that they project. Further, they never have Content. It goes without saying that they have no formal semantic properties of any kind. They do, however, have phonological properties, and if suppletion is to be excluded, these phonological properties may be underspecified enough to allow for contextual allomorphs, but specified enough to exclude radical stem changes. We now must ask, however, whether there is a reason to assume that a unit which is fundamentally phonological in nature, which has

⁸ Direct evidence for the failure of roots such as $\sqrt{\text{NAT}}$ or $\sqrt{\text{FICT}}$ to be associated with Content emerges when we contrast a derived nominal such as *fiction* with a derived nominal such as *formation*. The latter, but not the former, makes for a licit AS-nominal, a matter attributed, in Borer (2013a, 2014) to the availability of Content (by phase) for [_V $\sqrt{\text{FORM}}$] but not for [_V $\sqrt{\text{FICT}}$]. The reader is referred to the original discussion for details.

neither syntactic nor semantic properties, merges as a syntactic terminal. We must ask, in short, why roots.

The question, we note, certainly bears on language design, but insofar as linguistics does remain an empirical inquiry, this should be an empirical question. Is there, specifically, any *empirical* argument for merging, syntactically, terminals which have nothing but phonological properties, and if so, what are the ramifications for language design?

We note, first and foremost, that absent roots in the syntax, another device would need to be put in place to ensure the type of faithfulness effects described in section 4 above, as such effects cannot be captured in a phonologically-blind syntax. Phonological faithfulness in and of itself, however, does not provide evidence for the merger of roots as such, and could be otherwise modeled (for instance, through phases).⁹ Ultimately, however, the most basic (and hence often overlooked) evidence that roots are essential in the syntax emerges from the compelling fact that they are systematically obligatory, even when corresponding to neither syntax nor Content. Consider, from that perspective nonce forms, and by way of a graphic illustration, *Jabberwocky*. It has been frequently observed that functional items in *Jabberwocky* remain intact, and whatever syntax and interpretation *Jabberwocky* has, and it has plenty, emerges without any substantive Content. But in view of this, one must ask why the nonce terminals are necessary altogether. Specifically, why is (21a) an utterance in NL, however eccentric, but (21b) quite simply isn't.¹⁰ And yet, (21b) is entirely computable and interpretable, and has every bit as much syntax and semantics as (21a):

- (21) a. t'was (too) brillig and the (very) slithy toves/ did gyre and gimble in the wabe
 b. *t'was too (ig) and the very (y) (s)/ did and in the

The conclusion, counter-intuitive as it may appear at first, is that for the item at the bottom of an extended projection, root, Content is entirely dispensable, but not so phonological representation. In fact, and as is easy to demonstrate, realization for functional heads, Vocabulary Items, is frequently optional, but that is

⁹ Note that under a phase-based approach to faithfulness, a transferred phase effectively functions as a 'root' relative to the structure dominating it. From that perspective, then, the (deepest) root could then be viewed as a trivial (phonological) phase, thereby forcing it to have sufficiently specific phonological properties.

¹⁰ Note that the presence of unattached affixes does not suffice to exclude (21b), which would be equally unacceptable if all function terms were free standing. *Very* and *too* are added to illustrate that point.

never the case for substantive items. There are no null elements that correspond to *ROSE*, or *RED*, *MORNING* or even *THING*. There are, however, null elements that correspond to tense, to agreement, to operators, to determiners, and so on. From the perspective of language design, what emerges is that the syntax does, after all, trade in the organization of at least some sound, insofar as there exists a very well-prescribed slot in which such sound is obligatory, even if otherwise senseless. Roots, I propose, is the name of that slot.

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